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SPOTLIGHTING DEER:
Potentials for management in western Oregon[1]

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INTRODUCTION

Spotlighting of Columbian black-tailed deer (*Odocoileus hemionus columbianus*) has been tested as a sampling technique in the H. J. Andrews Experimental Forest on the west slope of the Oregon Cascades.[2] Research was conducted from May through October for 2 consecutive years.

The method, which requires a spotlight at night, is particularly suitable for openings in dense timber stands, such as on the west slope of the Cascade Range in relatively young logged units (3 to 5 years old). These openings, flush with shrubby and herbaceous food and cover, concentrate deer in small areas, providing excellent opportunity for observation. The particular herd studied inhabited a summer range above the line of heavy winter snows and therefore exhibited definite fall and spring migrations.

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[1] Primary research was conducted under the auspices of the Oregon Cooperative Wildlife Research Unit, Oregon State University, Corvallis, Oreg.

[2] Dealy, J. Edward. The influence of logging practices on Columbian black-tailed deer (*Odocoileus hemionus columbianus* Richardson) in the Blue River area of Oregon. 1959. (Unpublished master's thesis on file at Oreg. State Univ., Corvallis.)

REVIEW OF LITERATURE

Few studies have been conducted on spotlighting deer as a sampling technique. Anderson,[3] studying Columbian black-tailed deer under different environmental conditions than those reported in this paper, determined that the deer were influenced significantly in their standing and bedding habits by moonlight, temperature, and humidity changes. The latter two were particularly important during the day previous to sampling. He found differences of 36 percent in standing-to-bedded ratios from the first to the fifth hours of darkness. The extreme changes occurred during the spring to early summer period. He found changes of less than 20 percent during the summer to early fall period.

Progulske and Duerre[4] studied spotlighting of white-tailed and mule deer in South Dakota meadows. They found that moonlight, temperature, cloud cover, precipitation, dew, and relative humidity were important factors, and that temperature exerted the strongest influence on deer behavior.

EQUIPMENT AND PROCEDURES

A vehicle, 7 X 50 binoculars, and a spotlight were used. A pick-up with adequate safety bracing in the bed was preferred because the technician could stand up and better spot deer. The spotlight consisted of a sealed-beam unit with a bakelite pistol grip and a 20-foot cord reaching to the vehicle's cigarette lighter or battery terminals.

The sampling encompassed 27 logged units. These units included four habitats separated according to vegetative cover, slope aspect, and topographic characteristics. All had season-long water available. Habitats are described as follows:

I. North slope, low elevation; characterized by dense seasonal cover and slopes averaging 30 percent.

II. North slope, high elevation; characterized by sparse seasonal cover and slopes averaging 57 percent.

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[3] Anderson, Carl F. Nocturnal activities of the Columbian black-tailed deer, *Odocoileus hemionus columbianus* Richardson, affecting spotlight census results in the Oregon Coast range. 1959. (Unpublished master's thesis on file at Oreg. State Univ., Corvallis.)

[4] Progulske, Donald R., and Duerre, Donald C. Factors influencing spotlighting counts of deer. J. Wildlife Manage. 28: 27-34. 1964.

III. South slope, low elevation; characterized by moderate seasonal cover and slopes averaging 42 percent.

IV. South slope, high elevation; characterized by sparse seasonal cover and slopes averaging 25 percent.

A 30-mile route was mapped through the 27 units. Observation points were carefully located in each logged unit to give technicians a complete area coverage. The number and location of points varied between units and habitats according to topography and road location. Sampling was begun at approximately 9 p.m. each observation night and terminated at various times, depending on the number of deer seen and the time spent observing each individual. The minimum time spent was 2 hours when no deer were seen, and the maximum was 5-1/2 hours when 60 were counted. At each observation point, the vehicle was stopped and the accessible area searched thoroughly. The technician used the light to pick up eye reflection. He swept the visible area with the light, using short, fast, horizontal, flipping motions and gradually working up and down the slopes from the roadside to the edge of the logged unit or the effective limit of light, approximately one-quarter mile. With the deer facing the observer, eye reflection was easily seen, even with the light moving extremely fast. All detected eye reflections were counted. Those deer close enough to permit observations of physical details were classified as to sex, age, condition, and whether or not they were standing or bedded.

FACTORS AFFECTING COUNTS

Individual error.--Three individuals were selected to test operator error for this spotlight sampling method. Two were adults, and one was a 14-year-old boy; none had experience in this type of work. Each was given approximately 30 minutes of instruction covering techniques of searching for deer and the method of handling the spotlight. Also, each individual received approximately 15 minutes of practical experience in the field.

Instruction was conducted on simulated deer eyes. One-inch squares of white reflecting tape, the type used for vehicle safety, were used to simulate deer eyes. Two squares were glued 5 inches apart (center to center) on the crossbar of each of 55 "T" stakes. The stakes were placed in the field in 10 separate sample groups, each group with 4 to 8 pairs of "eyes" to eliminate the possibility of operators anticipating total numbers per sample.

The three technicians were taken as a group to each of the 10 sampling points. All of them sampled at each point before moving to the next. While the first technician was searching for simulated eyes, the other two kept their eyes covered. Out of a total of 55 pairs of "eyes" sampled by each of three persons, only 1 pair was

missed by one individual. That pair was hidden behind dense shrubbery, and only one "eye" was visible.

It was evident that if personnel are given thorough, yet not necessarily extensive, procedural training and practical experience, they can produce comparable data with respect to total number of eye reflections.

Deer standing vs. lying down.--One factor that is sure to affect spotlight deer counts, especially in heavy cover, is the proportion of total deer that are standing rather than lying down. It took an average of approximately 4 hours to cover the sampling route. To determine whether or not the deer showed any particular pattern with respect to standing or lying down, a given area was sampled for the first 4 hours of uniform darkness during the July-October period. The results are shown in figure 1.

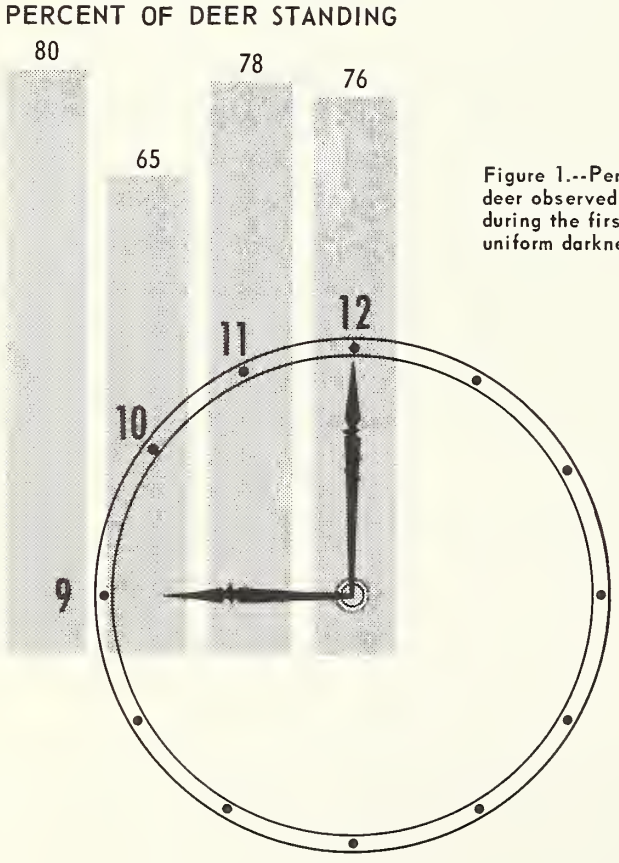

Figure 1.--Percent of total deer observed standing during the first 4 hours of uniform darkness, July-October.

The maximum difference, in percent of standing deer, between any two 1-hour units was 15 percent. Anderson (see footnote 3) found a similar difference during the July-October period and a much greater difference during the spring. Progulske and Duerre (see footnote 4) concluded that spotlighting should be restricted to a 4-hour period beginning 1 hour after sunset, because nearly 79 percent of all deer they counted were observed during this period. Numbers seen dropped off rapidly the fifth hour.

MANAGEMENT APPLICATIONS

Habitat preference.--The following data on habitat preference of Columbian black-tailed deer illustrate the type of information that can be obtained with spotlighting. These data were gathered with the expenditure of only 10 man-days each by two persons.

Total numbers of deer seen in habitats I through IV during the summer-fall season were 230, 64, 168, and 61, respectively. Number was highest in the north-slope, low-elevation habitat. The high-elevation habitats were least preferred and by about equal numbers of deer.

Habitat preferences by months during the total observation period are shown in figure 2. The low elevations were preferred over the

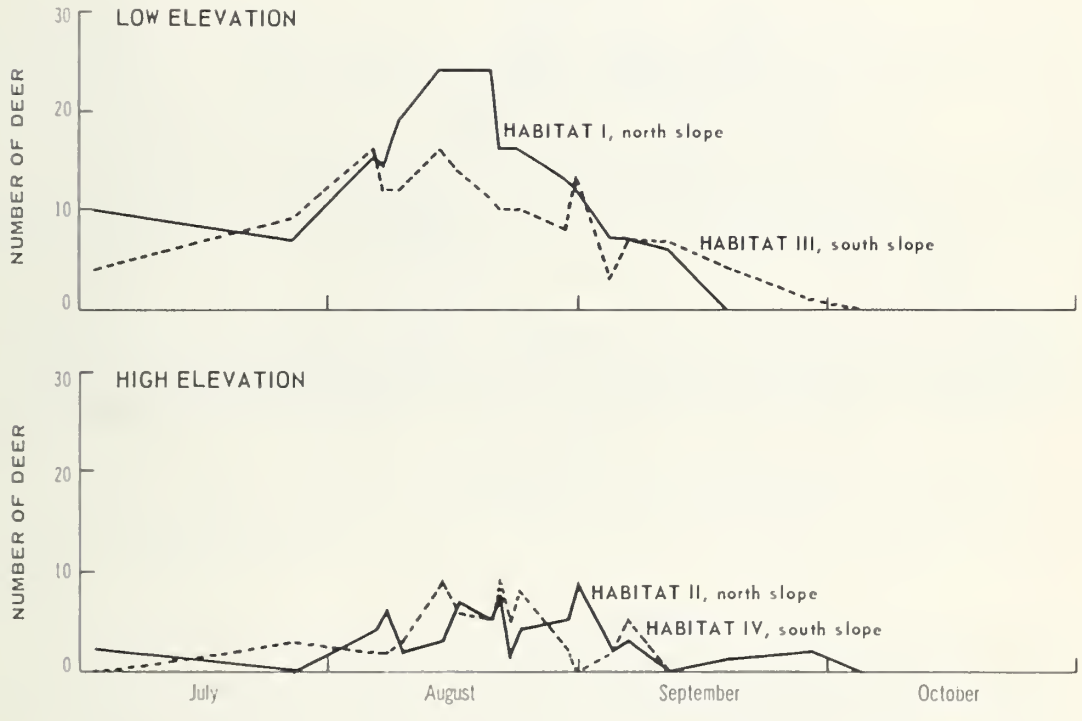

Figure 2.--Two pairs of habitats showing seasonal preference of deer and differences in use intensity.

high; and the north slope was preferred over the south during early and midsummer, probably due to more lush and palatable forage, moderate temperatures, and more cover for protection. However, during early September, north and south slopes appeared to be about equally used. Preference shown for the south slope during late September and early October is questionable since sample numbers were very low. The sample numbers from high-elevation, north- and south-slope units were small and erratic. Data from samples which have low numbers and are erratic seem to have limited value other than to indicate small populations.

Seasonal population trends.--The season-long patterns of deer use in all habitats were combined to illustrate the spotlight method for following seasonal population trends in the experimental forest (fig. 3). Observed animal numbers for both years increased gradually to midsummer and then dropped sharply through late August and September to October when samples showed no deer. Animal track observations confirmed the same seasonal fluctuation. Generally, most intense use occurred from July through mid-September.

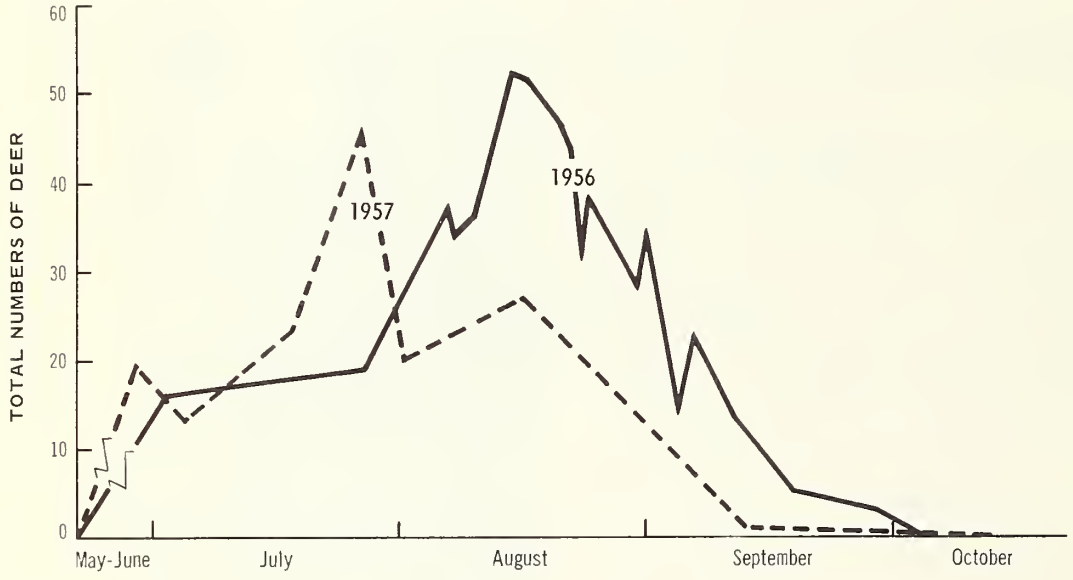

Figure 3.--Season-long deer use patterns for the H. J. Andrews Experimental Forest.

SAMPLING INTENSITY

A sample as defined here includes all observations of deer for one night. Sampling intensity will ordinarily be influenced by a number of factors, including the time and financing available for

the job, study area size, accuracy desired, sample route length necessary to cover the area of interest, and type of information sought. Only the latter will be treated here. The other factors vary with, and must be tailored for, each separate set of study conditions.

For following seasonal use preferences among habitats, numerous samples seem desirable; in this study, semiweekly sampling was considered acceptable.

For studying population trends over the entire season, fewer samples are probably adequate. Data shown in figure 3, from samples taken on an average of less than once a week for 2 years, produced useful information on general trends; however, sampling once weekly seems more desirable for a minimum.

If it is desirable to study the effect on deer activity of natural phenomena, such as a predicted severe temperature drop, a full moon, a storm, or other disturbance, then samples should probably be taken every night during the critical period because these phenomena occur rapidly and over a short period.

It should be pointed out here that reliability of the method will be increased both with more frequent samples than the minimums recommended and through carefully minimizing as many variables as possible.

METHOD LIMITATIONS

1. Observations from areas of low population density seem to be very erratic. Spotlighting will probably not yield reliable data in this situation other than to indicate a small population.

2. Value of comparing habitats of markedly different cover characteristics is obviously limited because, if populations are equal, the habitat with the best hiding cover would show fewer deer.

3. Changes in many environmental factors that influence spotlight counts of deer are not readily apparent at the time of observation. For this reason, data derived from spotlight counts must be recognized as indicative of very general trends rather than precise estimates.

ADVANTAGES

1. The technique of spotlighting deer is easily learned and easily applied.

2. Many observations can be taken within a comparatively uniform period with respect to deer activity (first 4 hours of uniform darkness) because deer are most active at night and are least disturbed then by vehicular activity.

3. Night-light sampling provides a maximum area coverage in a minimum time period.

4. A wide variety of information can be obtained with this technique, probably as wide or wider a variety than any single method now in use for studying deer population dynamics on natural ranges. Use intensity, movements, population trends, nocturnal activity, preferences, and seasonal relationships can be studied.

5. Very few deer were disturbed in the study area by a spotlight, even at quite close range. There was adequate time to observe many animals for sex and age grouping, which indicates that this method has possibilities for herd composition and productivity studies.

RECOMMENDATIONS

1. To minimize variability, which is difficult to measure, population samples should be taken on nights with similar weather and light conditions and when there has been no marked change in temperature and humidity during the day immediately previous to the sample.

2. With due regard for the limitations inherent in it, spotlighting can provide very useful information concerning population trends, habitat preference, and other facets of deer management such as herd composition.

3. As a management tool, spotlighting falls in the category of track counts, daylight trend counts, aerial counts, and pellet counts, all of which are currently in use with varying degrees of confidence.